

CLAIMS

What is claimed is:

1. An apparatus for conveying an image to a sensor,  
said apparatus comprising:

5 (a) a fiber optic cable comprised of individual  
optical fibers, said cable having a first end with a first  
shape and a first area, and a second end having a second  
shape other than said first shape and a second area;

10 (b) a sensor comprised of individual sensor  
elements, said sensor having substantially the same shape  
and substantially the same area as said second end without  
inscribing a circular image onto the shape of said sensor;  
and

15 (c) an optical system that produces an image.

20 2. The apparatus according to claim 1, wherein each  
individual optical fiber is assigned to one or more  
individual pixels.

25 3. The apparatus according to claim 1, wherein each  
individual pixel is assigned to one or more individual  
optical fibers.

4. The apparatus according to claim 1, wherein each individual optical fiber projects an image onto one or more individual sensor elements.

5 5. The apparatus according to claim 1, wherein one or more individual optical fibers project an image onto an individual sensor element.

6. The apparatus according to claim 1, wherein said first shape is in the form of said image.

7. The apparatus according to claim 6, wherein said first shape is configured as having at least one of a substantially circular cross-section, substantially elliptical cross-section or any subset thereof.

8. The apparatus according to claim 1, wherein said second shape is in the form of an image sensor.

20 9. The apparatus according to claim 8, wherein said second shape is configured as having at least one of a substantially rectangular and square cross-section.

10. The apparatus according to claim 1, wherein said first end is adapted to conform to a non-planar surface.

11. The apparatus according to claim 10, wherein said non-planar surface comprises a quadric surface.

12. The apparatus according to claim 10, wherein said non-planar surface comprises a spherical surface.

13. The apparatus according to claim 12, wherein said spherical surface is concave.

14. The apparatus according to claim 10, wherein said non-planar surface comprises a parabolic surface.

15. The apparatus according to claim 14, wherein said parabolic surface is concave.

16. The apparatus according to claim 10, wherein said non-planar surface comprises a hyperbolic surface.

17. The apparatus according to claim 10, wherein said non-planar surface comprises a convex surface.

18. The apparatus according to claim 1, wherein said second end is adapted to conform to a substantially planar surface.

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19. The apparatus according to claim 1, wherein said sensor comprises at least one of a CCD sensor, a CMOS sensor and a photographic plate.

10 20. The apparatus according to claim 1, wherein said optical system comprises one or more lens, one or more mirrors, or one or more lens and mirrors.

15 21. The apparatus according to claim 20, wherein said at least one or more mirrors is curved.

22. The apparatus according to claim 20, wherein said at least one or more mirrors is a convex parabolic mirror.

20 23. The apparatus according to claim 20, wherein said at least one or more mirrors is a convex or concave hyperbolic mirror.

24. The apparatus according to claim 20, wherein said at least one or more mirrors is a convex or concave spherical mirror.

5           25. The apparatus according to claim 20, wherein said at least one or more mirrors is an ellipsoidal mirror.

10           26. The apparatus according to claim 20, wherein said at least one or more mirrors is a convex or concave conical mirror.

15           27. The apparatus according to claim 1, wherein said optical system comprises an omni-directional imaging system.

20           28. The apparatus according to claim 1, wherein said optical system comprises a display screen mounted at said first end.

25           29. The apparatus according to claim 1, further comprising a computer readable set of instructions for inverting mapped images conveyed through said fiber optic cable.

30. The apparatus according to claim 29, wherein said instructions employ one or more lookup tables.

31. The apparatus according to claim 1, wherein a  
5 bundle of said individual optical fibers forms a coherent bundle.

32. The apparatus according to claim 1, wherein a  
10 bundle of said individual optical fibers forms an incoherent bundle.

33. The apparatus according to claim 1, wherein the  
15 fibers are arranged in a rectangular grid in which the rectangular grid corresponds to a rectangular grid on which elements of a sensor chip are located.

34. The apparatus according to claim 33, wherein each  
20 rectangular end of each fiber is placed directly in contact with a sensor or sensor element.

35. A method of conveying an image without blur, said method comprising the steps of:

(a) generating an image comprising individual pixels, each generated image having a first geometric shape and having a first surface area; and

(b) conveying said generated image through a non-tapered bundle of optical fibers comprising a plurality of individual optical fibers, said non-tapered bundle having a first end and a second end, in which (i) said first end is adapted to conform substantially with said first geometric shape of said generated image and to cover at least a portion of said first surface area of said generated image, and (ii) said second end is adapted to conform to a second geometric shape that is other than said first geometric shape of said generated image but which has a second surface area corresponding substantially to that portion of said first surface area covered by said first end, provided that said first geometric shape does not include a straight line and that a cross-sectional geometry of said first end differs from that of said second end.

36. The method of claim 35, further comprising the step of projecting each conveyed image onto a sensor array comprising a plurality of individual sensor elements.

5           37. The method of claim 35, in which the fiber bundle is coherent.

38. The method of claim 35, in which the fiber bundle is incoherent.

10           39. The method of claim 36, further comprising the step of eliminating loss of image resolution in a fiber optic bundle.

15           40. An apparatus for conveying a non-planar image to a planar sensor, said apparatus comprising:

(a) a lens or mirror that projects a non-planar image having a focal plane away from a surface of the lens or mirror;

20           (b) an optical fiber cable comprised of individual optical fibers, the cable having a first end and a second, said first end including first ends of said individual optical fibers, each fiber arrayed away from a surface of said lens or

mirror and in the focal plane of said lens or mirror, the second end of said cable comprising a planar array of second ends of said individual optical fibers; and

(c) a planar sensor in communication with said  
5 second end of said optical fiber cable.

41. An apparatus for conveying a non-planar image to a planar sensor, said apparatus comprising:

(a) a lens or mirror that projects a non-planar  
10 image having a focal plane away from a surface of the lens or mirror;

(b) an optical fiber cable comprised of individual optical fibers, the cable having a non-planar first end and a planar second, said first end having a first area and a shape substantially identical to a shape of a non-planar image projected away from the lens or mirror, said first end including first ends of said individual optical fibers, each fiber arrayed away from a surface of said lens or mirror and in the focal plane of said lens or mirror, the second end of  
15 said cable comprising a planar array of second ends of said individual optical fibers, the second end having a shape and a second area; and  
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(c) a planar sensor comprised of sensor elements in communication with the second end of said optical fiber cable, the sensor having a shape and area substantially identical to a shape and area of said second end.

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42. In a method of manufacture of an optical fiber cable for use in communication with a sensor, which cable comprises individual sensor elements, the sensor having a shape and an area, each individual optical fiber having two ends, the method comprising the steps of:

(a) obtaining substantially as many individual optical fibers as individual sensor elements in the sensor;

(b) arranging each individual optical fiber into an optical fiber cable forming a bundle, said cable having an end that has a shape and area substantially identical to a shape and area of said sensor, where each optical fiber is substantially aligned with at least one sensor element when the optical fiber is in communication with said sensor.